CHAPTER 3

Luxury and Scarcity: Exploring Anachronisms in the Market for Transformative Repair

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Introduction

One of the most interesting examples of repair and reuse from prehistory comes from Ötzi the Iceman, the well preserved, 5300 years old corpse of a man discovered in the Italian Alps in 1991. His clothing of animal hide shoes, goat leather leggings and a grass cape shows signs of repeated acts of repair. Travelling alone in mountainous terrain required self-reliance

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and material conservation in a time of scarcity. The repairs also show a range of techniques and materials mixed together, applied by different hands. One of his tools, an endscraper for preparing animal hides, was re-crafted from a knife, evidencing an early form of adaptive reuse (Wierer et al. 2018). His story is right at the beginning of a long history of repair and reuse as a practical necessity during times of scarcity. Yet, despite the emphasis on function and efficiency that seemingly aligns with conditions of scarcity, Otzi was not just self-reliant with repairs, but creative, and immersed in a culture of repair spread out across Europe that even suggests an emergent specialisation of repair labour during prehistory.

Conversely, luxury, defined here as material abundance, is now pervasive in the "developed" world, demanding a resurgence of repair in different present conditions. We place "developed" in inverted commas to suggest the flaws of a development defined by unsustainable consumption and the creation of huge volumes of waste. The leading response is recycling, but recycling systems are failing to manage the increasing diversification of products and complexity of waste streams; they are less energy efficient and more polluting than other circular economy approaches (Ghisellini et al. 2016). Recycling is constrained by entropy, limited by complexity and reliant on unskilled labour (Stahel 2013). There is an *assortment* problem within consumer waste—a complex mix and distribution of waste across the consumer-scape, in which each object or material further develops unique entropic features of wear, tear and decay. There is a need to re-focus on smaller loops with circular economy. Repair and reuse must be finely attenuated and discretely applied to individual products, or groups of products, if it hopes to manage such complexity within waste. This requires skilled rather than unskilled labour.

Designers and craftspeople appear to be well suited to this role by virtue of possessing visual arts and material manipulation expertise that may not just restore function but potentially also increase attachment and custodianship of products, as shown in previous studies (Keulemans and Rubenis 2019; Keulemans et al. 2017). Yet, globally, the design industries struggle to respond to this problem inherent to their industry: repair and reuse practices are not structurally integrated within their sector, while they decline within the broader services sector. The problem of waste is unevenly and unfairly distributed across nations and classes, in that those creating the most waste are not the ones that tend to deal with it. As with the broader structural impacts of climate change, waste is a problem for the poor more than for the wealthy, and for the colonised more than for

colonising nations. Hence waste is a matter of social as well as environmental significance, and a concern of just transitions and decolonisation. The perplexity is that repair and reuse are historically borne from conditions of material scarcity, but is now necessary within, and in response to, the converse conditions of luxury and material abundance that create the problem of waste in the first place. As Walter R. Stahel (2013) argues, successful circular economy needs functioning markets, and repair and reuse are far more likely to require and generate skilled labour—we posit, professional design labour—within such markets.

The project described in this article applies methods of *design-led* **transformative repair**—a creative reworking of broken or discarded consumer materials and objects to revitalise their functional, cultural and aesthetic value. Design-led in this context refers to repair and reuse carried out by trained, professional designers and craftspeople. Transformative refers not just to physical or material transformations, but potential changes in social, consumer or materials practices. This method, encompassing other practices termed visible mending, upcycling and adaptive reuse among others, is used to test possibilities for an industry response to unsustainable consumption. We are interested in both the economic and qualitative revaluing of transformed objects. Can transformative repair translate a value for materials, typically intrinsic to scarcity, into one adapted for the conditions of material abundance? What are the design and craft practices needed for such value translation? How does it reduce waste in practical terms, and align to market values?

Background

The Transformative Repair x Australian Design Centre (ADC) Auction develops from a lineage of interest in repair and reuse-related events gaining traction since the Dutch design venue Platform 21 ran their *Repairing* exhibition and series of workshops in 2009. Subsequent events elsewhere—such as *CERES' Darn it! – The Art of Repair, UTS' Fix-it Workshop: Refashion it - Upcycle! workshop,* and *The 2011 State of Design Festival's Repair Workshops* in Melbourne—were typically defined by terms such as "expert led" and "hands on", indicating that cultivated repair practice may be professionally led, but focussed on do-it-yourself (DIY) non-expert, and typically non-transformative, individual practice. It has been noted in participatory repair workshops that participants without visual arts or craft expertise struggled with the "meta-design" aspects of

transformation or personalisation through repair, suggesting the need for experienced practitioners to lead and innovate repair craft (McLaren and McLauchlan 2015). Likewise, it has been observed that designers and artists consider the social, cultural and metaphysical aspects of repair as extending beyond the object to create meaning, as a disciplinary expertise (Nicol and Bremner 2014). Some events, such as *Broken But Not Defeated* in Istanbul (2012) and the University of the Arts London's *The Department of Repair* (2015) worked with practitioners already well versed in creative forms of repair but did not introduce repair to professionals systemically unfamiliar with its practice. *Object Therapy* (2016) used qualitative methods of interview, photography and narrative analysis to capture the perceptions of end-users in response to transformatively repaired consumer objects (Keulemans et al. 2017) but did not assess the studio experiences of transformative repairers in detail. This assessment occurred in a follow up study (Keulemans and Rubenis 2019) but that study did not explore market viability. No other creative repair workshops or research events have to our knowledge explored market contexts—this includes the example of Serpentine Galleries' *In a State of Repair* in Milan (2014), a collaboration with the department store *la Rinascente*.

In response to these gaps, our research here investigates practitioner experience, market viability and material conservation through commissioned works of transformative repair as experimental case studies.

Theoretical Framework

Our research strategy is framed by transition design and its concepts and techniques for transitioning institutions and their stakeholders towards sustainable practices (Tonkinwise 2015, 87). Transition design addresses societal needs by intervening in design practices as transitions or "change points" that can "scale across" to broader communities, opening a pathway to futures that are more desirable, more just, less wasteful and more energy efficient (Irwin et al. 2015). As part of the design for sustainability movement, transition design assumes organisational change is desirable and viable, but requires socio-technological shifts (Ceschin and Gaziulusoy 2017).[1] Transition design specially and uniquely emphasises the role of human-scaled, designed artefacts for their "socio-material

[1] This idea historically develops as far back as Lewin's concept of "change levers" (1951) and Kotter's "8 stage process for change" (1995).

power" to effect such socio-technological shifts (Tonkinwise 2015, 86–87). The design of artefacts (or in this project, the design-led repair of artefacts) within a transition is considered experimental in the field, and attention is paid to the options they generate. This empowers craftspeople and designers as change-agents to address problems of waste and unsustainable consumption in their communities.

In this project, transition design theory guided the development of the transformative repair experimental case studies in ways that were able to be tested within a market and institutional setting, to explore service viability (and potentially income stream diversification) as well as material sustainability. We evaluate service viability via qualitative interviews and simple financial data, and sustainability improvements, primarily material conservation via qualitative assessment of individual works.

A limitation is that we are unable to assess within this text many of the conceptual and technical challenges adeptly resolved by our participants and the practice-based contributions these make to the field; we reserve this discussion for a forthcoming visual essay. In the following analysis we focus on those design-led decisions that are directly relevant to preparing works for market (whether auction or clientele).

Method

In collaboration and consultation with the Australian Design Centre, a leading Australian craft and design organisation, five people and one company were approached to provide broken or obsolete objects from their possession (Figs. 3.1–3.9). These participants, hereby referred to as the object Providers, include a fashion designer, a gallerist, a television and film actor, an author, a musician and furniture manufacturer. They were chosen in part due to their public visibility, and in part as champions and advocates for sustainable design. In previous studies it was noted that owners or providers of broken objects contribute to the narrative values of the repair projects and their outcomes by adding context, history and accounts of lived experience (Keulemans et al. 2017). In this case, participant selection was designed to build narrative values intrinsic to the broad intent of the project to lift the visibility of sustainable design. The objects obtained were allocated to eight leading or emerging Australian designers and craftpersons, hereby termed the Repairers. We allocated the objects based on suitability to their expertise, informed by their interest in some

objects or materials over others. Repairers were chosen in part by notability and by their professional expertise suited to repair and reuse, but it was not necessary for the Repairers to have practised repair and reuse before, although some had. We also considered cultural, professional and disciplinary diversity, and gender balance.

The Repairers then worked on transforming the objects, whether by restoration, repair or adaptive reuse, over a period of around 12 months (a period intended to be shorter but extended because of the COVID-19 pandemic restrictions). We agreed to pay a service fee to the Repairers from our research funding, based on guidelines from the National Association for Visual Arts for payment to a senior practitioner contributing work to a group exhibition. Recorded discussions and interviews were held with Providers and Repairers individually, and in some cases together when requested by a participant. Using a semi-structured/in-depth interview method we gathered from the Providers their interest, expectations, the history of the object, their relationship to it and their thoughts on its transformative repair. From the Repairers we asked about their background, education and expertise, their concepts and ideas for, and challenges with, transforming their object, as well as their interest in continuing with transformative repair practices in future and its economic viability. We typically interviewed at the end or near the end of the repair

Fig. 3.1 LIZ WILLIAMSON and TULLA CARSON, Transformed Plan-o-spider chairs, 2022

process so questions could be answered through self-reflection on the experience.

With two exceptions, the Providers gave their objects to the project, so that we could auction them once transformed. This meant that additional to the repair service fee, Repairers would be motivated by the prospect of receiving proceeds of sale at auction, minus a small commission of 15% for the ADC. Auctioneer Andrew Shapiro kindly worked pro bono. Two Providers, however, wished to retain ownership of their objects for sentimental reasons. For the Plan-o-spider chairs (Fig. 3.1) we mediated a negotiation for a repair fee to be paid by the Provider Sally Dan-Cuthbert directly to the Repairer Liz Williamson. For the other, Repairer Kyoko Hashimoto agreed to transform Hugo Gruzman's model Cessna 310R (Fig. 3.4) on the basis that Gruzman's other object, a model Qantas Boeing 747 (Fig. 3.3), would be auctioned for her benefit. Also relevant to financial aspects is that we offered a limited, additional production budget, typically equal to the repair fee, to reimburse for out-of-pocket expenses. Out-of-pocket expenses included payment for third-party support and two of the Repairers invited collaborators into their projects to be paid from these funds.

During the design processes, we visually documented experiments and works in progress for the purpose of visual, aesthetic and technical analysis. Some of these materials were sent to us by the Repairers as return briefs and status reports, but most were collected during studio visits. We photographed the completed works and prepared them for exhibition and auction by producing a catalogue that included estimates, an important feature for price signalling to the market. A marketing agency, Max & You, was employed to assist us in promoting the event across traditional and social media. Results are illustrated in Figs. 3.1–3.9 with financial aspects, material conservation notes and details of Repairer experiences in Tables 3.1–3.3.

Results

SALLY DAN-CUTHBERT × LIZ WILLIAMSON with TULLA CARSON

The repair of two Plan-o-spider chairs (Fig. 3.1), originally made by French manufacturer Hoffer in the 1950s and owned by Sydney gallerist Sally Dan-Cuthbert, presented unique challenges for Repairer

Table 3.1 Table of estimates, reserve prices and sales

Repairer	*Object*	*Estimate Range*	*Reserve price*	*Sale price*
Lucy McRae	Transformed Bianca Spender garments and sun lounge "Belonging"	15.5 to 22 k	15.5 k	Unsold
Adam Goodrum	Transformed Edra and Campana Brothers lamp "Displace Floor Lamp"	7 to 14 k	6 k	Lot 8: $7000
Illiam Nargoodah	Transformed axe, "Unbranded"	3 to 6 k	2.8 k	Unsold
Illiam Nargoodah	Miniature axe for Tim Flannery	NFS	N/a	N/a
Liz Williamson and Tulla Carson	Transformed Plan-o-spider chairs	NFS	N/a	N/a
Liz Williamson	Transformed chair webbing "Woven Plan-o-spider cord"	1.9 to 2.5 k each	1898	Lot 4: $1900 Lot 1-3 unsold
David Caon	Transformed 2008 Vespa LX125	4.5 to 8 k	4.5 k	Unsold
Kyoko Hashimoto	Transformed model Qantas Boeing 747 "Queen of the skies"	2.7 to 5 k	2.5 k	Lot 5: $2700 (post-auction sale)
Kyoko Hashimoto	Transformed model Cessna 310R	NFS	N/a	N/a
Kyoko Hashimoto and Ebony Fleur	Digital animation of Cessna 310R model aeroplane	From 0.1 ETH	0.1 ETH	0.11ETH

Liz Williamson and collaborator Tulla Carson. The chairs are rare, with a third chair from the set (originally a trio of chairs) donated by Dan-Cuthbert held within to the Museum of Applied Arts and Sciences in Sydney. Dan-Cuthbert wished to retain ownership of her two remaining chairs, so rather than send them to auction she chose to pay a repair fee. For Williamson and Carson this meant they felt the constraint of Dan-Cuthbert's expectation to restore the chairs to working condition

while retaining the design intention of appearing like a spider's web.[2] After extensive searching of elastic catalogues from around the world, they changed the colour scheme of the chairs to beige and golden metallic hues. Some cord was shipped from the US and some sourced locally by custom order. New powder coating was matched accordingly. Intriguingly, an early plan to plate the chairs entirely in gold was considered but abandoned due to cost and impracticality. However, the influence of Carson's jewellery training is found in new footpads that were hand moulded in wax and cast in bronze. On reflection of the project's constraints, Carson wondered whether this restoration was "transformative enough", but Williamson considered it significantly so. In our opinion, the colour change contrasts dramatically with the chairs' mid-twentieth-century origin.

As the chairs were not for sale, Williamson took the cord removed from the chairs and created four framed weavings that could be sold at auction (Fig. 3.2). Airtight archival frames were used, to both protect the fragile 60- to 70-year-old elastic and hide the peculiar smell of their decay that Williamson perceived. Reserves were set based on similar work sold by Williamson.

HUGO GRUZMAN × KYOKO HASHIMOTO and EBONY FLEUR

The fragility and fine details of two model aeroplanes provided by musician Hugo Gruzman directed us towards the expertise of a jeweller. Kyoko Hashimoto, after conversations with Gruzman, decided on a deconstruction and reconstruction of the model Qantas 747–400 into a crown, emphasising the most interesting details of livery and structure, such as logos and windows (Fig. 3.3). The crown typology was inspired by the contemporaneous branding of the aeroplane by Qantas as the "Queen of the Skies". Hashimoto conceptualised her design during the COVID-19 pandemic in which global travel had dwindled, and for Hashimoto, it suggested a climate change-related message; fossil fuel powered aircraft, like monarchy, felt like a harmful, antiquated phenomenon. This message contrasts visually with the typology of a crown as a symbol of royalty,

[2] Liz Williamson and Sally Dan-Cuthbert, interview via Zoom, 27th August 2021, and Liz Williamson and Tulla Carson, interview at Williamson's studio in Stanmore, NSW, Australia, 26th April 2022.

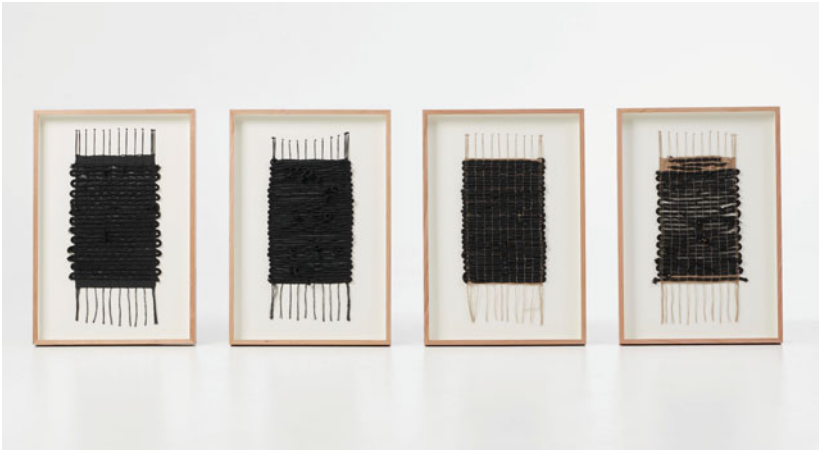

Fig. 3.2 LIZ WILLIAMSON, Transformed Plan-o-spider chair webbing "Woven Plan-o-spider cord", 2022

Fig. 3.3 KYOKO HASHIMOTO, Transformed model Qantas Boeing 747 "Queen of the skies", 2022

luxury and privilege. The reserve price was set according to other works Hashimoto had sold with a similar criticality, labour and material cost.

Conversely, a straightforward repair and restoration was chosen for the not-for-sale model Cessna 310R (Fig. 3.4). This custom-built model was inherited by Gruzman from his aviator grandfather and had sentimental value. However, as a spin-off "repair", a digital restoration of the

Fig. 3.4 KYOKO HASHIMOTO, Transformed model Cessna 310R, 2022

model aeroplane into a non-fungible token (NFT) artwork (Fig. 3.5) was proposed to engage the international market of fans for Gruzman's band Flight Facilities. Texas-based Australian designer Ebony Fleur became a collaborator on this task, designing a looped video 3D animation, with a custom soundtrack created by Gruzman. The NFT was auctioned on the same day as the physical auction at ADC, using the Ethereum blockchain on the marketplace platform Foundation.app with a starting (reserve) price typical for the platform. Ethereum was chosen due to its existing access to NFT markets and because it was scheduled for a change in its technical implementation (in September 2022), dramatically improving its energy efficiency compared to most other cryptocurrencies.[3]

TIM FLANNERY × ILLIAM NARGOODAH

Repairer Illiam's poetic transformation of an axe into a sculpture of trees and a log cabin (Fig. 3.6) "came to him" after looking at a *Backwoods* magazine. A Nyikina man from the Kimberley region of Western Australia, Nargoodah applies his skills broadly around the community, fixing fences on cattle stations when he is not making knives and other

[3] Cryptocurrencies consume massive amounts of energy, approaching 1% of global energy use, often framed in equivalence to the total energy expenditure of small countries such as New Zealand or Ireland. As a consequence, Ethereum transitioned from "proof-of-work" to "proof-of-stake" in the second half of 2022, a technical change that reduced its power use by "99.84% to 99.9996%" setting an imperative for other cryptocurrencies, such as Bitcoin, to follow, though this is not easy or possible in many cases (De Vries 2023).

Fig. 3.5 EBONY FLEUR (after KYOKO HASHIMOTO), Transformed model Cessna 310R "CESSNA" digital artwork, 2022. For animated version, visit: https://foundation.app/ebonyfleur/trnsrpr/2

objects from found materials such a salvaged metal from the bush. This was the first time he had created a sculpture with steel welding. Nargoodah said he "always struggled with putting prices on work" and while he suggested a price, he also said it was fine to leave that to our discussions with the auctioneer.[4]

In addition to the large axe transformation, Nargoodah also crafted a miniature axe for Provider Tim Flannery as a reciprocal memento of the project. While not for sale, this was shown alongside the axe at the auction exhibition (Fig. 3.6).

YAEL STONE × DAVID CAON

Repairer David Caon's transformative repair of Provider Yael Stone's Vespa motor scooter (Fig. 3.7) involved a customisation process in which he stripped the motorcycle back to its chassis and built it up with new components, some of them custom designed and/or fabricated in-house at Caon's studio. This is reflective of his experience in the aerospace

[4] Illiam Nargoodah, interview with via Zoom, 6th May 2022.

Fig. 3.6 ILLIAM NARGOODAH, Transformed axe, "Unbranded" and Miniature Axe for Tim Flannery, 2022

furniture industry "taking something that already exists and customising it heavily" in a way that potentially resolves problems in the original design. This is not salvaging old objects, but rather updating an approved and tested design to save time and money (considerably important in aerospace industry with its expensive research and development costs). Caon said his work in this project was conceptually similar but noted that the transformation was constrained by not working directly with Vespa's manufacturer Piaggio; he would like to have redesigned the bike through an industrial process rather than through a singular repair process. Caon did not discuss the bike with its Provider but focused on its marketability at auction as a leading consideration: "it ended up in being an exercise in how we can add some interesting and fun little touches that makes it a desirable object once again".[5]

For Caon, designing things that people buy is central to his work and he stated it would be fine to sell the scooter at the "red book" industry valuation for that model.[6] While Caon was keen to do similar work in

[5] David Caon, interview at his studio in Chippendale, NSW, Australia, February 21st, 2022.

[6] Redbook is an online vehicle pricing platform in Australia, published previously in hardcopy for many decades.

Fig. 3.7 DAVID CAON, Transformed 2008 Vespa LX125, 2022

future, it would depend on budget and support, as this particular repair was not economical and exceeded Caon's production budget.

EDRA and CAMPANA BROTHERS × ADAM GOODRUM

The first thought that Repairer Adam Goodrum had upon receipt of the scratched and mildly bent lamp, designed by Campana Brothers provided by its Italian manufacturer Edra, was that it would be nice to use all of its pieces in a "displaced" but "sympathetic" reconfiguration. He secondly noted a vision for a shifted function: "Knowing that it would be in exhibition and for sale, I liked the idea that it could be independent… … that someone can just take it away as a light that can be plugged in without needing a sparky [electrician] to install it" (Fig. 3.8).[7]

The change from a pendant lamp to a freestanding floor lamp required the addition of a central stem that Goodrum speculated would bounce light from the interior of the shade "to enhance this kind of sparkle, a dancing reflection". Goodrum sees the transformation, in which everything is fully reused, as aligning with Cradle-to-Cradle theory (McDonough and Braungart 2002) to minimise waste. Goodrum hesitated to propose a reserve price for auction during our interview; we did that later via email.

[7] Adam Goodrum, interview at his studio in Redfern, NSW, Australia, 22nd February 2022.

Fig. 3.8 ADAM GOODRUM, Transformed Edra and Campana Brothers lamp "Displace Floor Lamp", 2022

Fig. 3.9 LUCY MCRAE, Transformed Bianca Spender garments and sun lounge "Belonging", 2021

BIANCA SPENDER × LUCY MCRAE

Repairer Lucy McRae noted in her interview that she explores "unusual acts of care through art, story and materials". Her transformation uses waste clothes provided by fashion designer Bianca Spender, blended with industrial materials, upholstered over foam affixed to a second-hand sun lounge designed by Richard Schultz in 1966 (Fig. 3.9). The foam cushion structures created by McRae are removable so that a user can immerse themselves within the lounge, as well as upon it, in a way that feels like "a combination of rigid and cosy". The work is aligned with McRae's existing body of work concerned with psychology, comfort, protection and the future of humanity. She notes: "I love building stuff. I love building worlds and making things that are highly detailed where, somehow, the narrative is borne from what is made and exploited through the details of what is in the making".

McRae is cognisant that much of her work doesn't have an easily identifiable place within the art or design market but feels that her focus on speculative art and future visioning is making her work increasingly relevant. She initially declined to nominate a reserve price for auction, but was nonetheless confident about the value of the work:

> I would like to think that the price at which it is auctioned takes into consideration the work that I'm doing at the level of science and thought leadership. Each work that I make is an archive of a future that is a discussion around where humanity is going, and this is a manifestation of that question. And whoever is going to buy this, is part of a committee, and part of a conversation in saying, 'I want to be part of how the future is decided, and this is how I'm expressing it.'[8]

Auction

On the night of June 9, 2022, three lots were sold, including the NFT, plus one the following day from a buyer slow to bid the night before. The Plan-o-spider chair repair might be added to this list as it was otherwise paid for through a market process.[9]

[8] Lucy McRae, interview via Zoom, 9th December 2021.

[9] The moderate success or moderate failure of the auction, depending on viewpoint, was likely tempered by factors beyond our control. For example, the auction was held

Relevant to our framework of transition design, the auction was novel for the parties involved; Shapiro's had not auctioned dedicated works of transformative repair before, and the ADC had not hosted an auction. The latter necessitated new administrative procedures and the drafting of forms and procedures supported by advice from Shapiro's, including a bidding conditions document, bidder registration protocols and modifications to ADC's artist contracts**.** From the perspective of transition design outlined above, these activities constitute the kind of socio-technological change points required for transitions to scale across communities, should the event be duplicated in the future at ADC, or in similar organisations elsewhere (Table 3.1), (Table 3.2), (Table 3.3).

Discussion

The problem of consumer waste is recurrent in modern design. Prior to the repair and reuse events described in the Background section above, there were intriguing but nascent product design proposals hinting at solutions to consumer waste across the twentieth century. Some are more notable than others. Adaptive reuse in Western product design since the 1960s has been situated in relative conditions of luxury, sometimes as a counter-aesthetic or antithetical response to it. Achille and Pier Giacomo Castiglioni's Mezzadro tractor seat chair (1954), for example, has an appearance of "make do" frugality, but used new tractor seats in production, leveraging the same manufacturing economies of scale and consistency of component inventory as other products of industrial design. Ricardo Dalisi's experiments with actual reuse of existing waste in the early 1970s, making furniture and shelters with street children, is, however, less well known (Catenacci and Galimberti 2017).

The tricky logistics of working with waste leads to incongruous examples. The Campana Brother's prototype (1991) for their Favela Chair used scrap wood, but not the production version made by Edra (2002). Yet, Humberto Campana said during his interview for our research project: "Since the beginning we had this question about sustainability. We didn't

mid-winter during a time of uncertain public health conditions after more than a year of COVID pandemic lockdowns.

Table 3.2 Table of material conservation notes

Repairer	*Object*	*Material Conservation notes*
Lucy McRae	Transformed Bianca Spender garments and sun lounge "Belonging"	Not all garments used. New materials include foam and textiles. Sun lounge structure obtained second-hand and conserved
Adam Goodrum	Transformed Edra and Campana Brothers lamp "Displace Floor Lamp"	Nothing removed. Every component used with new additions including a central support pole, a footswitch and a few extra aluminium plates
Illiam Nargoodah	Transformed axe, "Unbranded"	Nothing removed. Axe conserved with new additions of derelict steel found in the bush
Illiam Nargoodah	Miniature axe for Tim Flannery	Fabricated from axe repair offcuts and bush materials
Liz Williamson and Tulla Carson	Transformed Plan-o-spider chairs	Chair frame conserved. Feet, elastic cord and paint replaced, some via overseas shipping. Some waste cord was used in the additional artworks. New swing tags added
Liz Williamson	Transformed chair webbing "Woven Plan-o-spider cord"	Waste cord from the Plan-o-spider chairs, but new frames include newly sourced timber and glass materials
David Caon	Transformed 2008 Vespa LX125	Majority of the bike conserved. Newly fabricated or sourced components include mirrors, grips, foot rails, and carrier rack with box. The original seat was conserved, with some foam removed, and re-upholstered

(continued)

Table 3.2 (continued)

Repairer	*Object*	*Material Conservation notes*
Kyoko Hashimoto	Transformed model Qantas Boeing 747 "Queen of the skies"	Only selected parts of the model aeroplane were utilised. New sterling silver structure comprises majority of the object's weight and is typically a mix of recycled and newly smelted silver and other metals
Kyoko Hashimoto	Transformed model Cessna 310R	Nothing removed. New additions are small amounts of paint, glue, plus 3D printed accessories
Kyoko Hashimoto and Ebony Fleur	Digital animation of Cessna 310R model aeroplane	N/A. Digital recreation

want to work with noble woods from the Amazon. So, we started to make things that give a 'second skin' to materials that already exist".[10]

There is clearly a desire and intention to work with waste reflected among designers. What seems to be missing are techniques and approaches that ease the challenge and allow scalability. Curiously enough, the irregularly patterned modularity of components found in designs from the Campana Brothers may embed a disposition for reconfiguration. While we were unable to conclude if the Edra-made, Campana Brothers-designed lamp in this project used industrial offcuts as it appears or not, Adam Goodrum was nonetheless able to deftly reconfigure the aluminium components without creating any more waste.

But waste presents other challenges beyond its reconfigurative potential. From the historical discourse, Tejo Remy's Rag Chair (1991) also appears like it uses waste material but is noted to use new textiles in its production version (De Rijk 2010). This may have less to do with economies of scale and more with cleanliness. As discussed in this project, airtight frames were made for the elastic weavings created from the scraps that came off the Plan-o-spider chair because the decay of old textiles produced an entropic challenge; they smelt.

[10] Humberto Campana, interview via Zoom, 20th May 2022.

Table 3.3 Table of Repairer interest in continuing transformative repair

Repairer	*Object*	*Interest in continuing transformative repair practice*
Lucy McRae	Transformed Bianca Spender garments and sun lounge "Belonging"	Yes. McRae was keen on the furniture aspect and happy with the outcome; it was hard to let the lounge go away for auction. But doing it again requires looking at what was created as a process of iteration; something that wasn't possible in this project as a new work
Adam Goodrum	Transformed Edra and Campana Brothers lamp "Displace Floor Lamp"	Yes, Goodrum enjoys these kinds of projects as private commissions, contingent on market suitability and "special reasons"
Illiam Nargoodah	Transformed axe, "Unbranded"	Yes. He hopes to be invited to more projects in future. A lot of what Nargoodah does already around his community is repair based, and he is keen to apply his skills broadly
Illiam Nargoodah	Miniature axe for Tim Flannery	
Liz Williamson and Tulla Carson	Transformed Plan-o-spider chairs	Williamson: yes, but not with an object of this type. Carson: yes, but with more time for iteration. It was challenging to think outside the normal sphere of design in reworking someone else's design
Liz Williamson	Transformed chair webbing "Woven Plan-o-spider cord"	
David Caon	Transformed 2008 Vespa LX125	Yes, Caon would love to do more of this kind of stuff, but with the right budget and technical support

(continued)

Table 3.3 (continued)

Repairer	*Object*	*Interest in continuing transformative repair practice*
Kyoko Hashimoto	Transformed model Qantas Boeing 747 "Queen of the skies"	Hashimoto thought that it was a hard question to answer and that it depends on the circumstances. If the object "spoke to her", she would say yes
Kyoko Hashimoto	Transformed model Cessna 310R	
Ebony Fleur	Digital animation of Cessna 310R model aeroplane	Definitely. It was great having the link between the [digital object] and the real object, and having such a great collaborator in Hashimoto, her handcraft is very beautiful. It was special for Fleur to be respectful to that handwork in her design

These challenges of scalability, assortment and entropic decay, seem to make economies of working with waste materials unfeasible. In the process of manufacturing and marketing, waste gets swapped for new materials. This may even be intentionally desirable rather intentionally pragmatic; as suggested by David Caon wishing to work with Vespa (Piaggio) the company, rather than with *a* Vespa as a single motorscooter, designers are attracted to the consistency and scalability of normative industrial manufacturing.

Our transformative repair project makes no aspirations for increasing economies of scale in the usual sense, but it does propose that scalability is potential in a transverse direction; by potentialising nascent systems for repair and reuse *across* the industry and market sector in ways that are finely attenuated and discretely applied. That is, developing an infrastructure and market so that clientele are aware of transformative repair as a service; desire it for the broken objects to which they are attached, and become connected to the designers they value as repairers. Furthermore, infrastructure, market, institutions and client expectations must motivate designers to work with broken objects and waste materials, and reward the extra effort, time and labour that transformative repair requires.

The results of this study may indicate that transformative repair as a market service only exists as a niche, bespoke and artisanal practice reliant on institutional support. Nonetheless, it exists, and can exist, in conditions of material abundance because transformative repair has capacity for designers and craftspeople to manipulate values intrinsic to the conditions of waste. The assortment of products can foster sentimental attachment by design, and design can augment perceived values of uniqueness or rarity, as illustrated in the case of the Plan-o-spider chairs. Even wear and tear can be exploited by design as a value, as shown by David Caon highlighting the dented sides of the Vespa with stickers reading "Yael Damage", a pun on the name of Provider Yael Stone, see Fig. 3.7).[11]

While the current economics of transformative repair are less compelling, we intuit this may be true for many transitions in early stages of development. Further effort is required to find efficiencies in practice, but also shift the perception of value in the market. While not discussed in this paper, such mechanisms follow from the propositions that it is not labour but the use of non-renewable resources that should be discouraged through taxation policy (Stahel 2013). So, government subsidy or tax relief for design-led repair services is needed or, conversely, inhibition of its competitive practices (linear waste-based production and consumption practices) by opposite means. It is an increasingly urgent matter of public interest that both government and industry work to slow the replacement of broken objects by newly made products manufactured from virgin resources, but also increase the uptake of consumer-accessible repair and reuse services, of which transformative repair is just one novel possibility.

Competing Interests

The authors have no conflicts of interest to declare that are relevant to the content of this chapter.

[11] "Yael Damage" refers to the dents on the side of the motorscooter, and the pun is based on "hail damage", referring to hailstorms in Sydney infamous for damaging motor vehicles left outside.

Ethical Clearance

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the University of New South Wales (HC200740) and the University of South Australia (204511). Informed consent (to participate and/or to publish) was obtained from individual participants.

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